

REMARKS

The Office Action mailed April 11, 2008, has been received and the Examiner's comments carefully reviewed. Claims 1, 3, 7, and 14 have been amended. Claims 1-19 therefore are pending. No new matter has been added, and favorable reconsideration of this application is requested in view of the following remarks.

Claim Rejections - 35 USC § 103

In the Office Action, claims 1, 3, 14 and 16-19 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Choy et al. (U.S. Patent No. 5,487,120, hereinafter "Choy") in view of Lebby et al. (U.S. Patent No. 5,218,465, hereinafter "Lebby") and Lee et al. (U.S. Patent No. 6,502,997, hereinafter "Lee") and Sekiguchi et al. (U.S. Patent No. 6,814,546, hereinafter "Sekiguchi"). Claim 2 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Choy in view of Lebby, Lee, and Sekiguchi, and further in view of Ramaswami (U.S. Patent No. 6,571,030). Claims 4-6 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Choy in view of Lebby, Lee, and Sekiguchi, and further in view of Jiang et al. (U.S. Patent Pub. 2002/0024698, hereinafter "Jiang"). Claims 7-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Choy in view of Lebby, Lee, and Jiang. Applicants respectfully traverse each of these rejections of the claims.

A. Claims 1, 3, 14, and 16-19

Independent claims 1, 14, and 16 are amended in the present response to further define the invention of the present application. These claims are amended to illustrate the specific arrangement of conversion cards and types of signals converted using the present invention. As illustrated below, these claims are distinguishable from the combination of art at least because (1) Choy teaches away from use of a "common format signal" or "main signal" as recited in the claims, and (2) the combination of art fails to disclose each element of the claims.

1. Claims 1, 14, and 16

Claim 1 requires “a plurality of separate optical to electrical converters connecting to a backplane, each optical to electrical converter removably mated with the circuitry and configured to transmit and receive common format signals and operate at a separate wavelength.” Claim 1 also requires “a plurality of separate electrical to electrical converters, each directly and removably mated with one of the optical to electrical converters at a card edge connector to receive a power signal and to send and receive common format signals, each electrical to electrical converter including input and output signal locations and configured to provide conversion between native protocol media signals and the common format signals.” Finally, claim 1 is clarified in the present response to require that “the common format signals [has] the same format for each of the plurality of separate optical to electrical converters.”

Claim 14 requires “a plurality of separate optical to electrical converter cards received by each chassis, each optical to electrical converter card connecting to a backplane in the chassis and operating at a separate wavelength to transmit and receive a main signal, each optical to electrical card removably mated with the circuitry via the backplane”, and “a plurality of separate main signal to electrical converter cards received by each chassis, each main signal to electrical converter card removably and directly mated with one of the optical to electrical converter cards at a card edge connector, each main signal to electrical converter card including a main signal port and configured to convert between the main signal and a native protocol media signal.” Finally, claim 14 is also clarified in the present response to require that “the main signal [has] the same format for each of the plurality of separate optical to electrical converter cards.”

Claim 16 requires, among other elements, “mating a plurality of optical to electrical converter cards to the circuitry via a backplane,” as well as “removably and directly mating an electrical to electrical converter card to a selected one of the optical to electrical converter cards at a card edge connector to receive a power signal and to communicate via the main signal with the selected one of the optical to electrical converter cards, wherein the electrical to electrical converter card transmits and receives native protocol media signals in a first format, and converts the signals to a second common format signal. Claim 16 is also clarified in the present response to require that “Finally, claim 1 is clarified in the present response to require that “the common

format signals [has] the same format for each of the plurality of separate optical to electrical converter cards.”

Each of claims 1 and 14 generally describe a system in which electrical to electrical conversion cards convert electrical formats, and optical to electrical conversion cards convert that main signal or common format signal to an optical media for transmission via a wavelength division multiplexer. Claim 16 claims operation of such a system. In the Application, Figure 4 illustrates one possible embodiment of this system in which the electrical to electrical conversion card has front connections to channels 22 carrying native protocol media signals, and Figure 6 illustrates a different embodiment in which native protocol medial signals at channels 22 are received into a portion of the electrical to electrical conversion card that plugs into the backplane at a rear side of the system:

FIG. 4

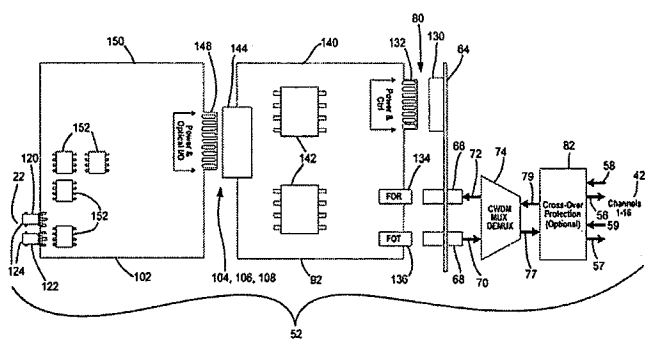
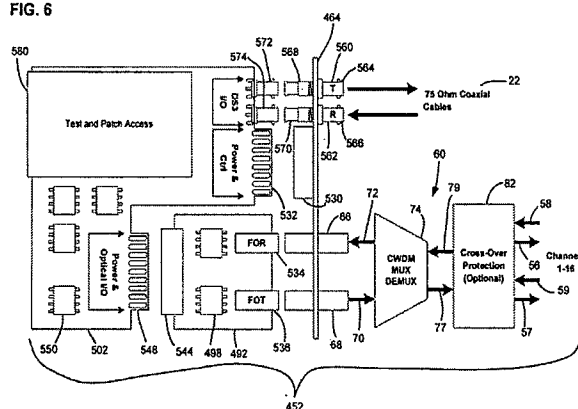


FIG. 6



In the embodiments shown, the electrical to electrical conversion cards 102, 502 receive power connections from the optical to electrical conversion cards 92, 492 (and therefore from the backplane) via a card edge connector, allowing linear positioning of the electrical to electrical conversion cards with their associated optical to electrical conversion cards. In the various embodiments claimed, the electrical to electrical conversion cards communicate a common format or main signal to the optical to electrical conversion cards, such that each optical to electrical conversion card expects to receive a consistent format of data (e.g. NZRI).

In use, the present invention operates by receiving native media protocol signals from the channels 22, which are then converted in the electrical to electrical conversion cards (e.g. cards 102, 502) to a common format signal or main signal. This signal is then converted into an

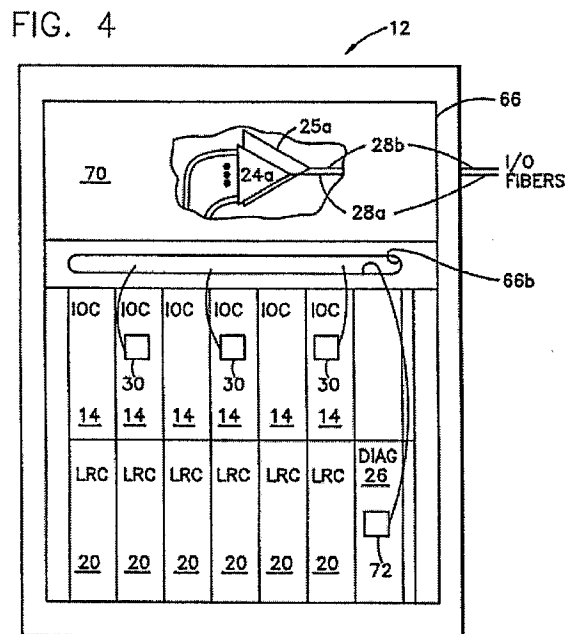
optical signal by the optical to electrical conversion cards, for transmission at a desired wavelength. The optical signal is transmitted through the backplane 64, 464, and to a WDM multiplexer/demultiplexer arrangement and optional crossover protection equipment, and to a corresponding piece of equipment at an opposite side of an optical channel 42. An opposite process occurs for signals received at the optical interface: demultiplexed, passed through the backplane, converted to an electrical signal (remaining in main signal or common format signal format) at the optical to electrical conversion cards, then converted to a desired native media protocol signal at the electrical to electrical conversion cards.

In the present disclosure, the common format or main signal is the same format signal across each of the optical to electrical cards within the system. Therefore, each WDM end is entirely independent of the opposite end, and can support entirely different electrical to electrical conversion cards.

When the above invention, as recited in claims 1, 14, and 16 is compared to the asserted references, a number of distinctions become apparent, as explained below.

2. Choy Teaches Away from the Claimed Invention.

First, when Choy is compared to the present invention, it becomes apparent that the reference teaches away from a combination that would render claims 1, 14, and 16 obvious. Choy first teaches away from use of an electrical to electrical conversion card for converting a native protocol media signal to a common protocol signal or main signal. Choy relates generally to a wavelength division multiplexing system “for protocol-independent serial data sources.” See Choy, title. Choy includes, as shown in Figure 4, Input/Output cards (IOCs, 14) and Laser/Receiver cards (LRCs, 20) which each are plugged into a backplane in a top/bottom arrangement:



Electrical signals received at the IOCs are transmitted to the LRCs via the backplane, and then passed on to a wavelength division multiplexer for transmission on optical fibers to an opposing, complementary system (e.g. as shown in Figure 1 of Choy).

The system of Choy is called “protocol-independent” in that it explicitly does not alter the protocol with which data is transmitted. Choy does not disclose altering the protocol of data received by the system on the input and output signals connected to the I/O card. Rather, once a protocol is selected for each channel of the system of Choy, the data passed along that optical channel remains constant through communication via the WDM. As stated in Choy, “the components [of the IOC card] are constructed and operated *in accordance with the specific data stream type that is input to and output from the associated channel of the WDM*”. Col. 4:39-42 (emphasis added). Although the Office Action indicates that “Choy never states that the same data format . . . is also transmitted between the multiplexer/demultiplexers,” (Office Action at p. 4) Choy indicates that matched connections are required at each side of an optical channel, because no common or main signal conversion takes place: “The user must only ensure that the two IOCs. . . are the same type, and that the associated LRCs are installed and operate at the same wavelength.” Col. 7:32-35. This is required so that each IOC can connect to equipment that understands the transmitted protocol (which may be different in each channel). And, regardless

of whether some electrical conversion is performed at the IOC of Choy to connect to a specific I/O connector (Applicants continue to maintain that no conversion is performed), it is certainly not a conversion to a common or main signal, as claimed.¹

Because Choy requires consistent formatting on both sides of the optical channel and fails to disclose any conversion therebetween, it is entirely inconsistent with an arrangement that uses conversion to a common or main signal format, which is used in the present application to allow flexible conversion at each side of an optical distribution channel. Therefore, the Choy reference teaches away from reformatting data to comply with a main signal or common signal protocol.

Secondly, Choy also teaches away from an arrangement in which an optical to electrical conversion card directly connects to an electrical to electrical conversion card at a card edge connector in the manner claimed. The Office Action indicates that use of a card edge connector would be a matter of design choice (see, e.g. Office Action at pp. 6, 11); however, Choy indicates that “*All connections to the LRCs 20 are made by back-panel connectors that are mated when the LRC is inserted into its specified slot.*” Col. 7:1-3 (emphasis added). Therefore, in Choy, the LRC *only* connects to a backplane, and explicitly does not directly connect to an IOC (let alone via a card edge connector). Furthermore, the LRCs of Choy are disclosed to be hot-pluggable (col. 7:36-38). The LRCs of Choy therefore must be accessible for exchange during operation of the WDM, and LRC substitution would not be blocked by connection to an IOC via a card edge connector, as in the claimed configuration, and as has been alleged in the Office Action.

For at least the above reasons, Applicants assert that Choy teaches away from the claimed configuration of claims 1, 14, and 16.

3. The Cited Combination of References Fails to Disclose or Suggest the Claimed Combination of Elements

¹ Applicants recognize that different IOC cards are used for different native protocols; however, Choy requires use of the same types of IOC card at opposite sides of an optical channel, indicating that conversion to a common or main signal format is not performed. Applicants’ present claim amendments are intended, at least in part, to clarify this issue for the Examiner.

Notwithstanding the fact that Choy in fact teaches away from the claimed combination of elements, the combination of Choy, Lebby, Lee, and Sekiguchi fails to disclose or suggest the combination of elements recited in claims 1, 14, and 16. Specifically, the combination of references fails to disclose (1) use of a common format or main signal across a plurality of optical to electrical conversion cards, (2) directly and removably mating an electrical to electrical conversion card to an optical to electrical conversion card, or (3) use of a card edge connector to transmit power signals from an optical to electrical conversion card to an electrical to electrical conversion card, or to transmit and receive main or common format signals.

First, none of the cited references discloses use of a common format signal across all of a plurality of optical to electrical conversion cards. Choy fails to disclose this element, as previously discussed and as acknowledged in the Office Action at p. 19. Furthermore, the reference alleged to disclose a common format signal does not do so in the context of a plurality of optical to electrical conversion cards, as claimed. Therefore, it also cannot disclose or suggest this element.

Second, none of the cited references discloses direct, removable connection of an electrical to electrical conversion card to an optical to electrical conversion card, as is required by claims 1, 14, and 16. The Office Action indicates that this arrangement is disclosed in Choy, in that the LRCs and IOCs are connected via the backplane of that reference. (Office Action at p. 3). However, connection via an intermediate circuit board (the backplane), or merely communicative or electrical connection, is not claimed. Rather, the claimed configuration requires *direct, removable* connection between an electrical to electrical conversion card and an optical to electrical conversion card. This connection provides the arrangement shown in Figures 4 and 6 of the present application, and is inconsistent with the arrangement of Choy which requires both the LRCs and IOCs to be hot-pluggable, and requires the LRCs to have all connections on a rear side connecting to the backplane, as described in part A.2.

Third, none of the cited references disclose use of a card edge connector to transmit power signals to an electrical to electrical conversion card, or to transmit and receive main or common format signals. The reference cited by the Office Action as disclosing a card edge connector, Sekiguchi, in fact is not arranged in the manner claimed, and does not disclose

transmission of power or main/common format signals via the card edge connector, or connection of an optical to electrical conversion card to an electrical to electrical conversion card. Furthermore, even were there conversion to a main or common format signal, there is not disclosed in any of the references a teaching or suggestion to do so on an electrical to electrical conversion card.

For at least these additional reasons, Applicants assert that the combination of references fails to render obvious claims 1, 14 or 16.

4. Claims 3 and 17-19

Claim 3 depends from claim 1, and claims 17-19 depend from claim 16. Each of these claims is allowable for at least the same reasons set forth above with respect to claims 1 and 16, respectively. Applicants therefore respectfully request reconsideration and withdrawal of the rejection of these claims as well.

B. Claim 2

Claim 2 depends from claim 1, and inherits all of the limitations of that claim. Claim 2 is not rendered obvious for at least the same reasons as set forth with respect to claim 1, and also because Ramaswami cannot remedy the deficiencies of the claim (i.e. with respect to the card edge connector and operation of the electrical to electrical conversion card). Applicants therefore respectfully request reconsideration and withdrawal of the rejection of this claim.

C. Claims 4-6 and 15

Claims 4-6 depend from claim 1, and claim 15 depends from claim 14. These dependent claims therefore inherit all of the limitations of claims 1 and 14, respectively, and are not rendered obvious for at least the same reasons. Specifically, Jiang, the added reference, does not teach or disclose the elements as described in part A.2, above, and is further not combinable with the other references to arrive at the claimed invention for at least the reasons set forth in part A.1, above. Applicants therefore respectfully request reconsideration and withdrawal of the rejection of these claims.

D. Claims 7-13

Independent claim 7 recites, among other elements, a backplane including “an input power port, a control signal port, and a plurality of optical interface ports for interfacing with an optical to electrical conversion card, each optical interface port including a power port, a control signal port, and at least one optical port.” The claim also requires “optical to electrical cards each including a backplane interface portion for mating with the optical interface port and including a power port, a control signal port, and at least one optical port, each optical to electrical card including optical to electrical conversion circuitry for converting between common format signals and optical signals, each optical to electrical card including an electrical interface port including a power port, a control signal port, and at least one electrical port.” The claim further requires “a plurality of electrical to electrical cards each including a rear interface portion including a card edge connector for removably mating directly with the electrical interface port and including a power port, a control signal port, and at least one electrical port, each electrical to electrical card including electrical to electrical conversion circuitry for converting between native protocol media signals and common format signals, each electrical to electrical card including a media interface port including at least one main signal port.”

The combination of Choy, Lebby, Lee, and Jiang does not render claim 7 obvious, at least because (1) Choy teaches away from the claimed configuration and (2) this combination fails to teach or suggest each of the elements of the claim. As recited above in part A.1, Choy teaches away from conversion to a common format signal, and also teaches away from direct, removable mating between an electrical to electrical conversion card and an optical to electrical conversion card. Furthermore, none of the references disclose use of a card edge connector to transmit power signals to an electrical to electrical conversion card, or to transmit and receive main or common format signals, as claimed. Applicants therefore respectfully request reconsideration and withdrawal of the rejection of claim 17.

Claims 8-13 depend from claim 7, and inherit all of the limitations of that claim. Applicants therefore respectfully request reconsideration and withdrawal of the rejection of these claims as well, for at least the same reasons as with respect to claim 7.

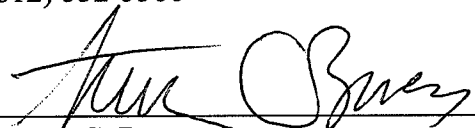
Conclusion

It is respectfully submitted that each of the presently pending claims is in condition for allowance and notification to that effect is requested. Although certain arguments regarding patentability are set forth herein, there may be other arguments and reasons why the claimed invention is patentably distinct. Applicant reserves the right to raise these arguments in the future. The Examiner is invited to contact Applicant's representative at the below-listed telephone number if it is believed that the prosecution of this application may be assisted thereby.

Respectfully submitted,

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